9/95

U.S. Steel - Joliet Works
Will County
ILD 005 454 566
Superfund/HRS

CERCLA
Site Inspection Prioritization Report

Illinois Environmental Protection Agency

2200 Churchill Road
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-020-

1. INTRODUCTION

On September 27, 1994 the Illinois Environmental Protection Agency's (IEPA) Site Assessment Program was tasked by the United States Environmental Protection Agency (U.S. EPA) to conduct a CERCLA Focused Site Inspection Prioritization (FSIP) of the former US Steel (USS) site located in Joliet, Illinois.

USS was initially placed on CERCLIS (Comprehensive Environmental Response, Compensation and Liability Act Information System) on August 1, 1980. In 1984 a Preliminary Assessment was conducted by IEPA and in 1990 the US EPA's contractor Ecology and Environment, Inc. (E & E) conducted a screening site inspection. During this inspection, eight soil samples were collected. In May of 1995 the IEPA's site assessment program prepared and submitted a work plan for additional sampling to be conducted at USS. The sampling portion of the FSIP was conducted on May 23 and 24 when the sampling team collected a total of two soil samples from the facility and nine soil and seven sediment samples from the surrounding area.

IEPA performed FSIP activities for the site to fill information gaps which may have existed in previous CERCLA investigations and to determine whether, or to what extent, the site poses a threat to human health and the environment. This FSIP report presents the results of IEPA's evaluation and summarizes the site conditions and targets pertinent to the migration and exposure

pathways associated with the site. This report is organized into five sections, including this introduction. Section 2 describes the site and gives a brief site history. Section 3 provides information about the FSIP activities including the site reconnaissance, site representative interview and the sampling. Section 4 furnishes information about the potential sources of contamination. Section 5 provides information about the four potential migration and exposure pathways (groundwater migration, surface water migration, soil exposure, and air migration).

2. SITE DESCRIPTION AND HISTORY

The former USS property is located at 927 Collins St., Joliet, Illinois, in Will County, (southwest 1/4 section 3, northwest 1/4 section 10, Township 35N., Range 10E.). USS property consisted of two separated parcels of land; one where the steel milling operations occurred (main facility) and one where the coking operations were located. The property of the main facility consists of approximately 180 acres and is bordered to the east and south by residential areas, on the west by the Illinois and Michigan (I & M) Canal and the Des Plaines River, and to the north by the Joliet Correctional Center. The former coking facility is located on a long, narrow strip of property between the Des Plaines River and I & M Canal approximately one mile to the north of the main facility. Due to the differing operations and geographic distance in between the main facility and coking facility, only the main facility was thoroughly investigated

during the 1995 CERCLA sampling event. Figures 2-1 through 2-5 show the former USS property and its surroundings.

USS had owned the entire site since at least the 1860's, when the steel plant was constructed. USS operated the steel milling operations from the 1860's until the 1930's, during which a variety of steel products were manufactured. In the 1930's the production of steel ceased and wire production was introduced to the site, which involved the production of rods, wire, woven fence, barded wire, nails, concrete reinforcing mesh and other miscellaneous wire products. USS became a part of USX in 1986 and the property was then divided into lots and put up for sale. The property was divided into 11 lots and are now occupied by several owners. These include American Steel and Wire (AS&W), Gateway, Botts, Graphics Paper, and the Will County Forest Preserve. The majority of the buildings left from USS are on the AS&W property. The USS wire facility portion was taken over by AS&W.

In addition to the main facility, USS operated a coking operation on a piece of property located about a mile to the north of the main facility. This facility had four large coking ovens which produced coke that was used to charge USS' blast furnaces during steel production. At the current time, an automobile junkyard is located at the former coking operation property.

For a more thorough discussion of the description and history of the site refer to E & E's 1990 CERCLA Screening Site Inspection Report.

FIGURE 2-1

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY	SITE: U.S. Steel SITE ILD 005 454 566
ILLINOIS STATE MAP N↑	
LEGEND: ● Site Location	

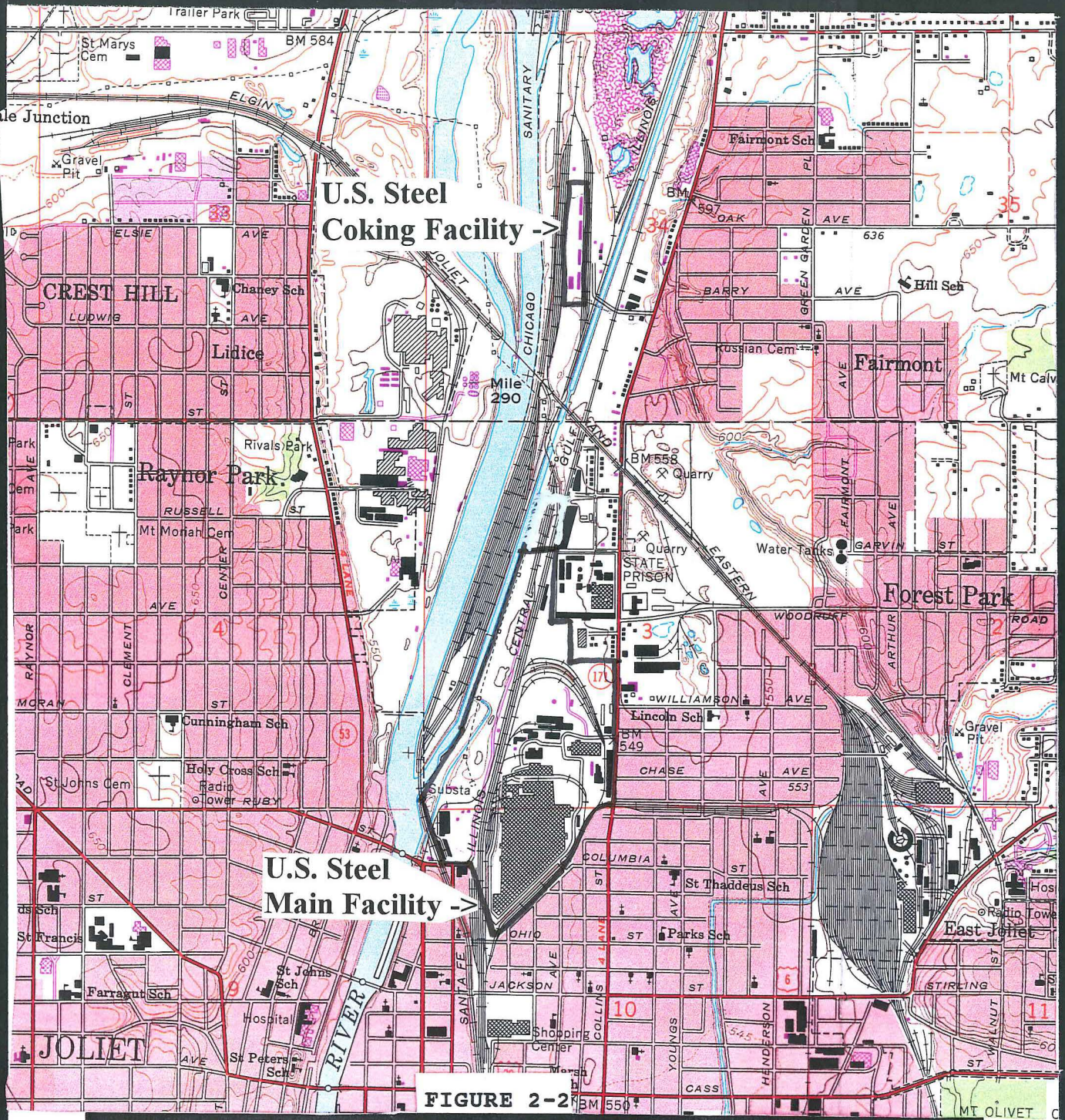
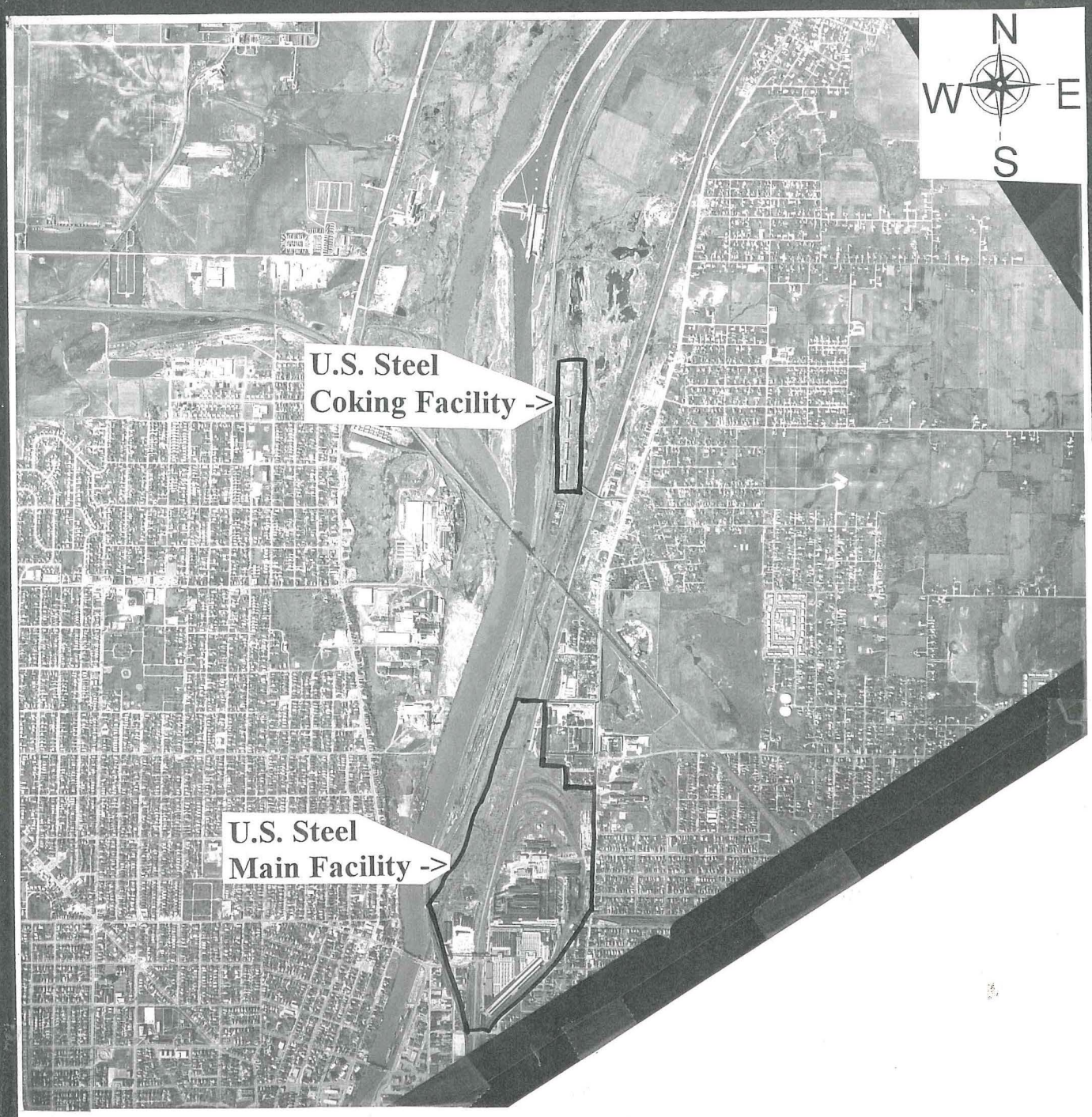


FIGURE 2-2

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY	SITE: U.S. Steel SITE ILD 005 454 566
REGIONAL AREA MAP	N↑
Scale: 1:24,000	
LEGEND: ☐ Site Location	


N
W
E
S
U.S. Steel
Coking Facility ->
U.S. Steel
Main Facility ->
FIGURE 2-3
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
SITE: U.S. Steel
SITE ILD 005 454 566
1969 Aerial Photograph Map
Scale: 1:28,000
LEGEND: Site Location

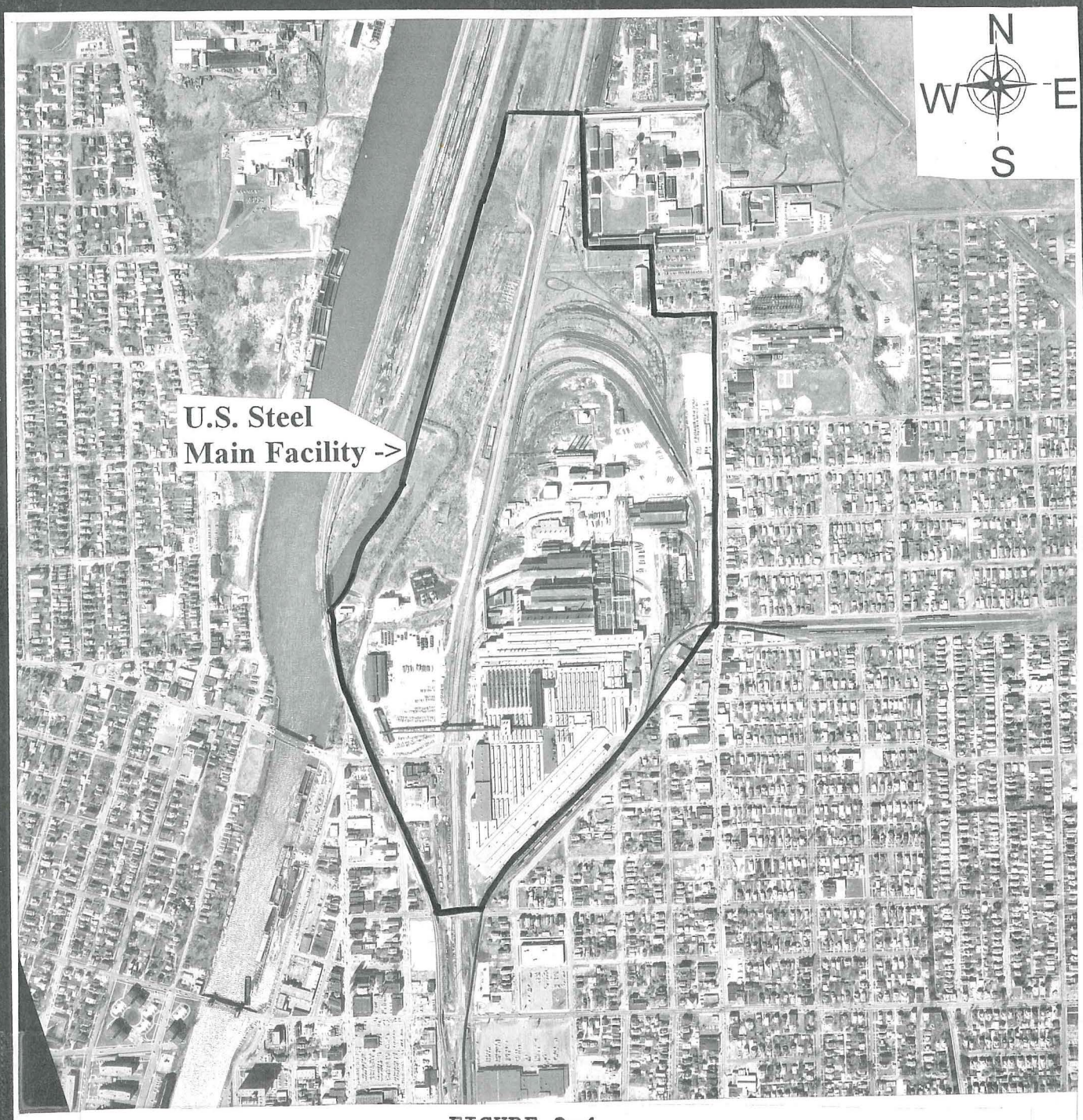


FIGURE 2-4

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY	SITE: U.S. Steel SITE ILD 005 454 566
1976 Aerial Photograph Map	
Scale: 1:12,000	
LEGEND: ☐ Site Location	

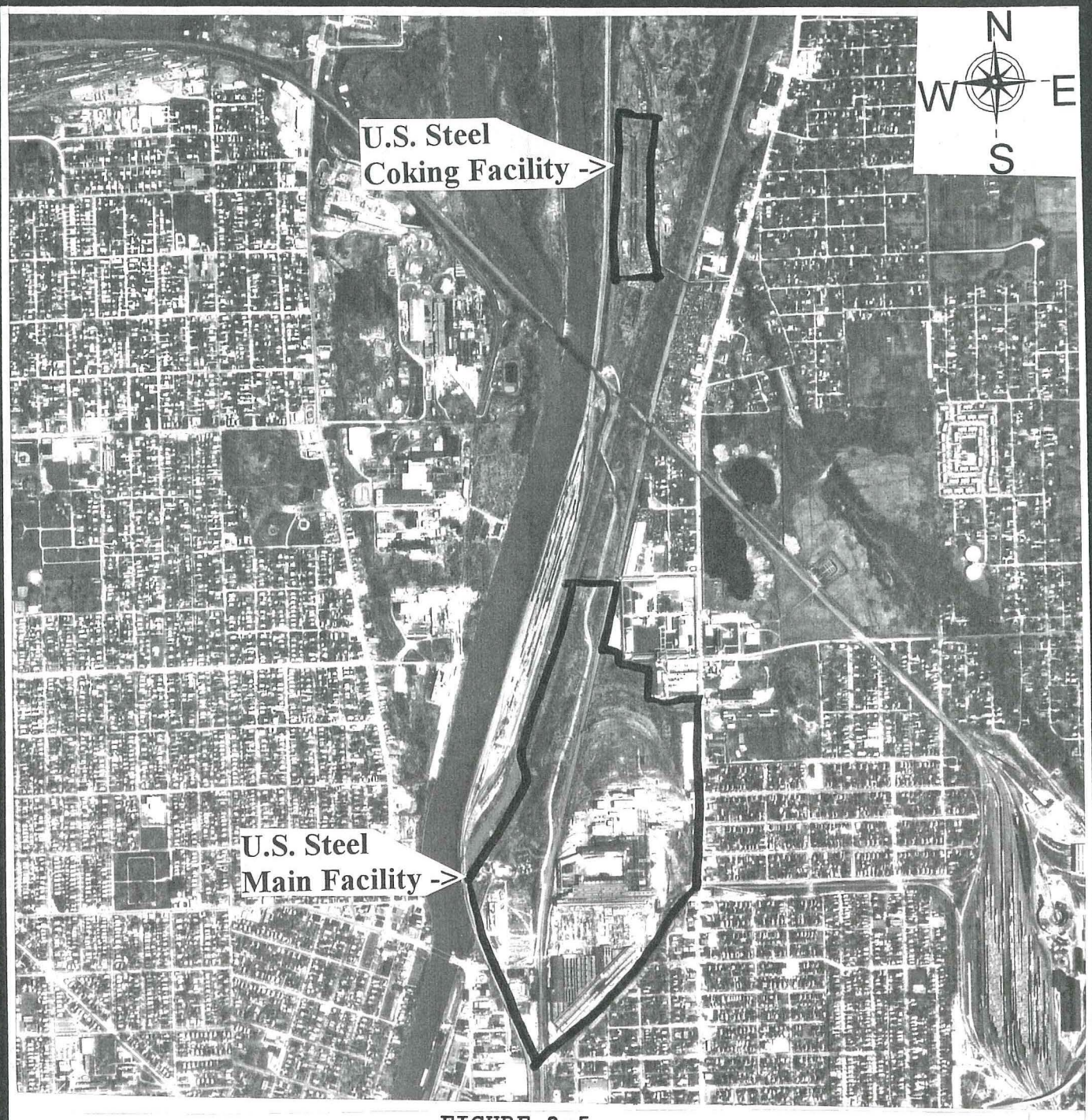


FIGURE 2-5

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY	SITE: U.S. Steel SITE ILD 005 454 566
1993 Aerial Photograph Map	
Scale: 1:20,000	
LEGEND: ☐ Site Location	

3. FSIP ACTIVITIES

3.1 RECONNAISSANCE INSPECTION AND SITE REPRESENTATIVE INTERVIEW

On May 2, 1995, Mr. Peter Sorensen of the IEPA conducted a reconnaissance of the former USS Steel property and met with Mr. Dennis Cohil, a representative of AS&W. The site reconnaissance included a visual inspection of the property to determine the location of site wastes and the integrity of the containment of the site, to identify potential on and off-site sampling locations, and to survey the surrounding land uses. The information attained during the reconnaissance is included in the site description in Section 2 of this report.

Prior to making the site reconnaissance, Peter Sorensen talked with Dennis Cohil to gather information concerning current and past site activities, as well as to explain both the CERCLA FSIP process and the specifics of the upcoming CERCLA sampling event. Peter Sorensen also discussed the site history and CERCLA process over the phone with Mr. John Varos of AS&W and John Zaborski of USX Realty Development. AS&W and USX were both given the opportunity to split samples with IEPA during the sampling event but both declined.

3.2 SOIL/SEDIMENT SAMPLING

On May 23 and 24, 1995, IEPA personnel collected two soil samples from the former USS property, nine soil samples from nearby properties and seven sediment samples. The purpose of these

samples was to help determine if areas of contamination were present at the former USS property and the surrounding residential areas and waterways. The results of these samples are discussed in Section 5 on migration pathways. Figures 3-1 and 3-2 on the following three pages show the locations of each soil and sediment sample. Table 3-3 describes each soil and sediment sample with its location, depth and physical appearance noted. Table 3-4 shows a summary of the analytical results from these samples and Table 3-5 provides a summary of the key samples. Key samples are samples in which contaminants were detected at concentrations at least three times background levels.

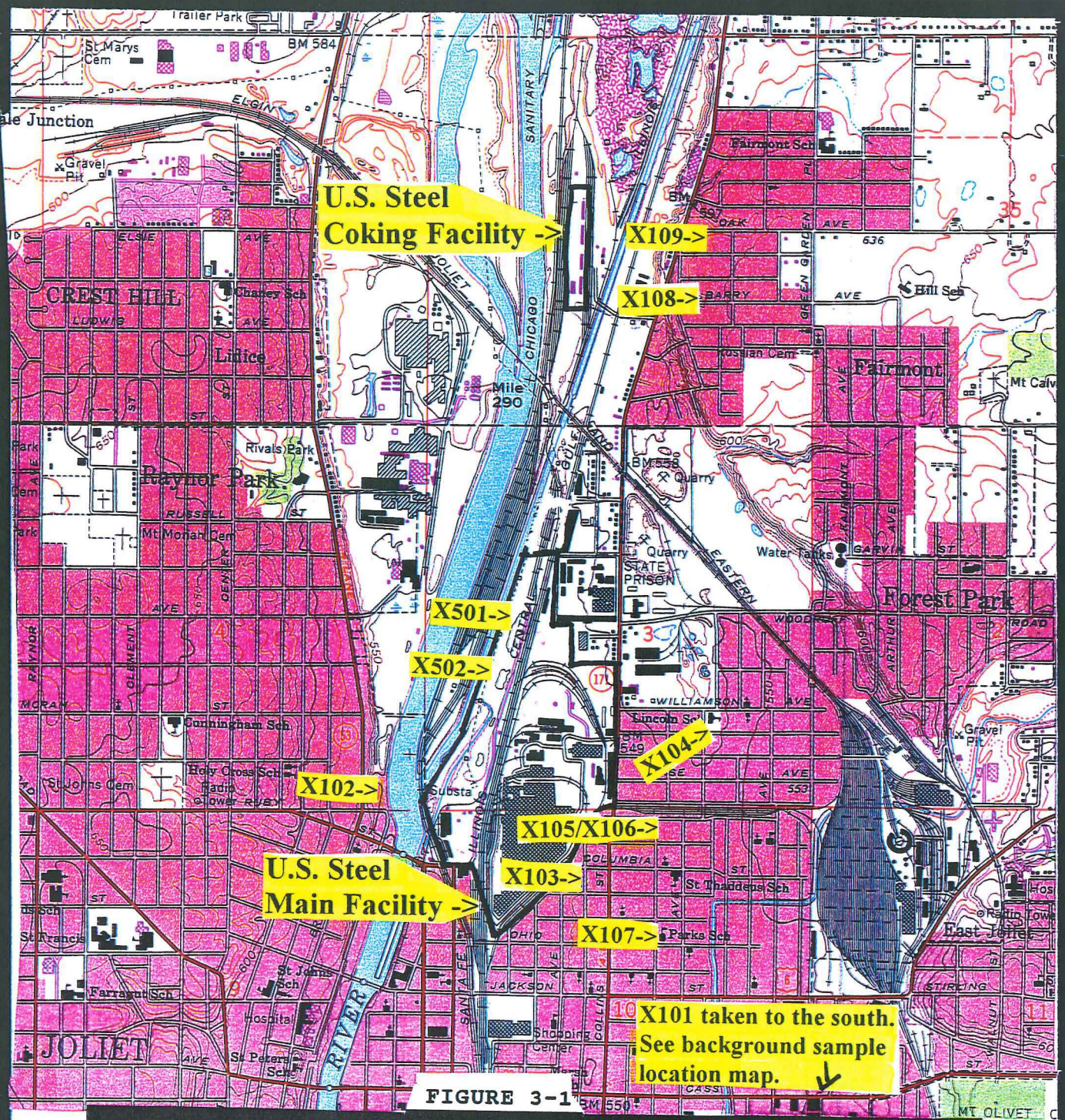


FIGURE 3-1

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY	SITE: U.S. Steel SITE ILD 005 454 566
SOIL SAMPLE LOCATION MAP	
Scale: 1:24,000	N ↑
LEGEND: ☐ Site Location	

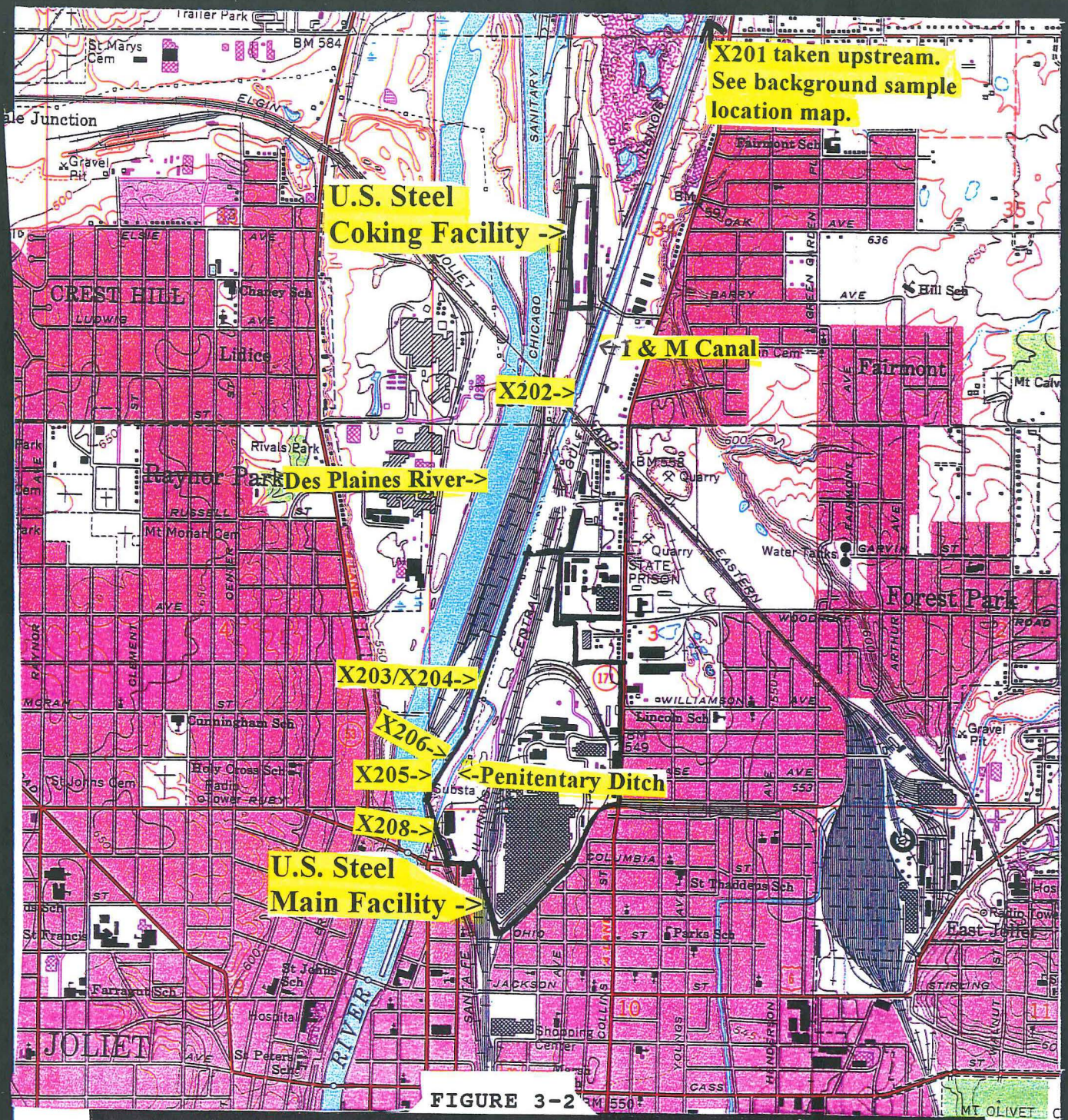


FIGURE 3-2

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY	SITE: U.S. Steel SITE ILD 005 454 566
SEDIMENT SAMPLE LOCATION MAP	
Scale: 1:24,000 N↑	
LEGEND: Site Location	

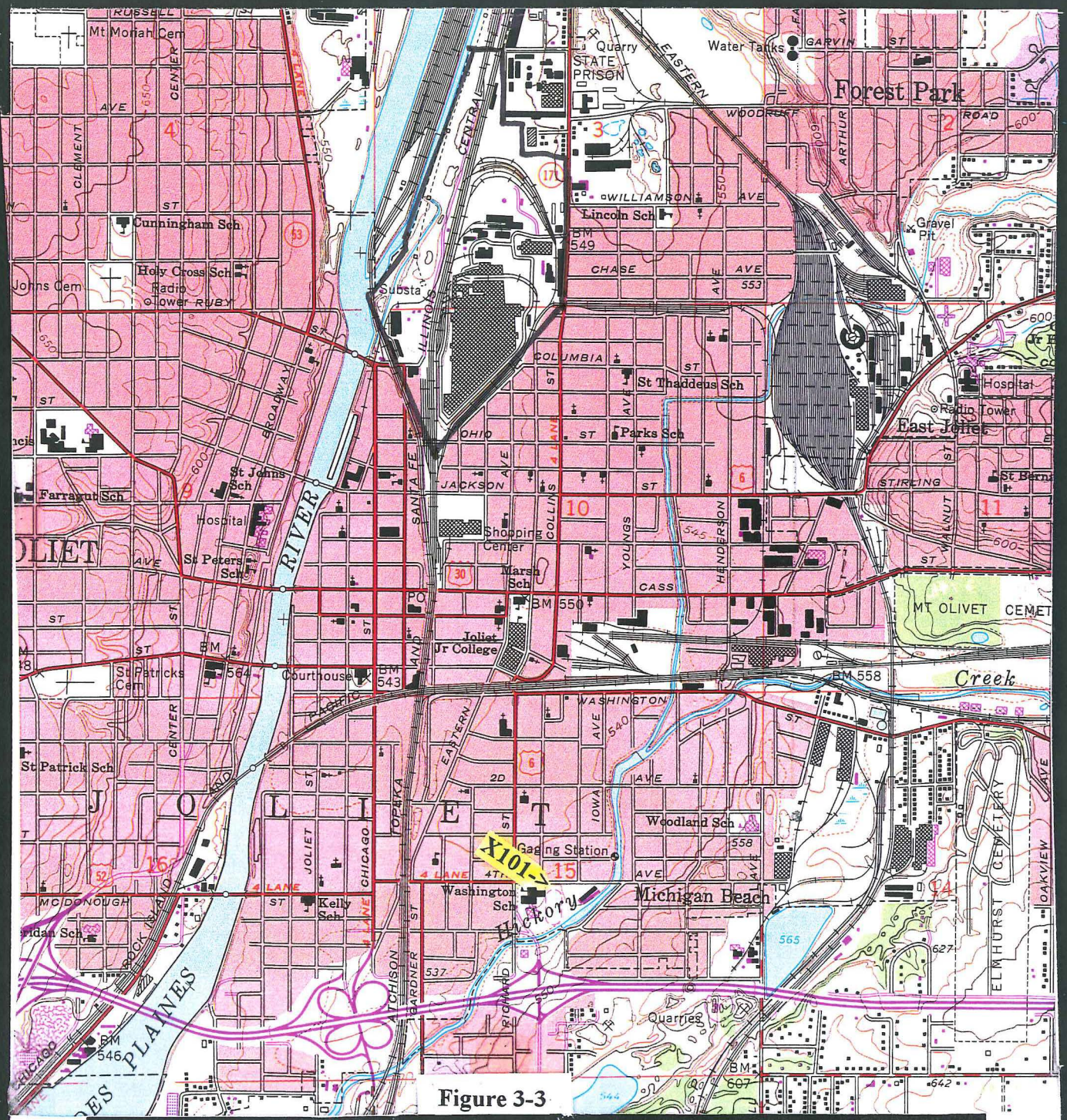


Figure 3-3

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY	SITE: U.S. Steel SITE ILD 005 454 566
BACKGROUND SOIL SAMPLE LOCATION MAP	
Scale: 1:24,000	
LEGEND: ☐ Site Location	

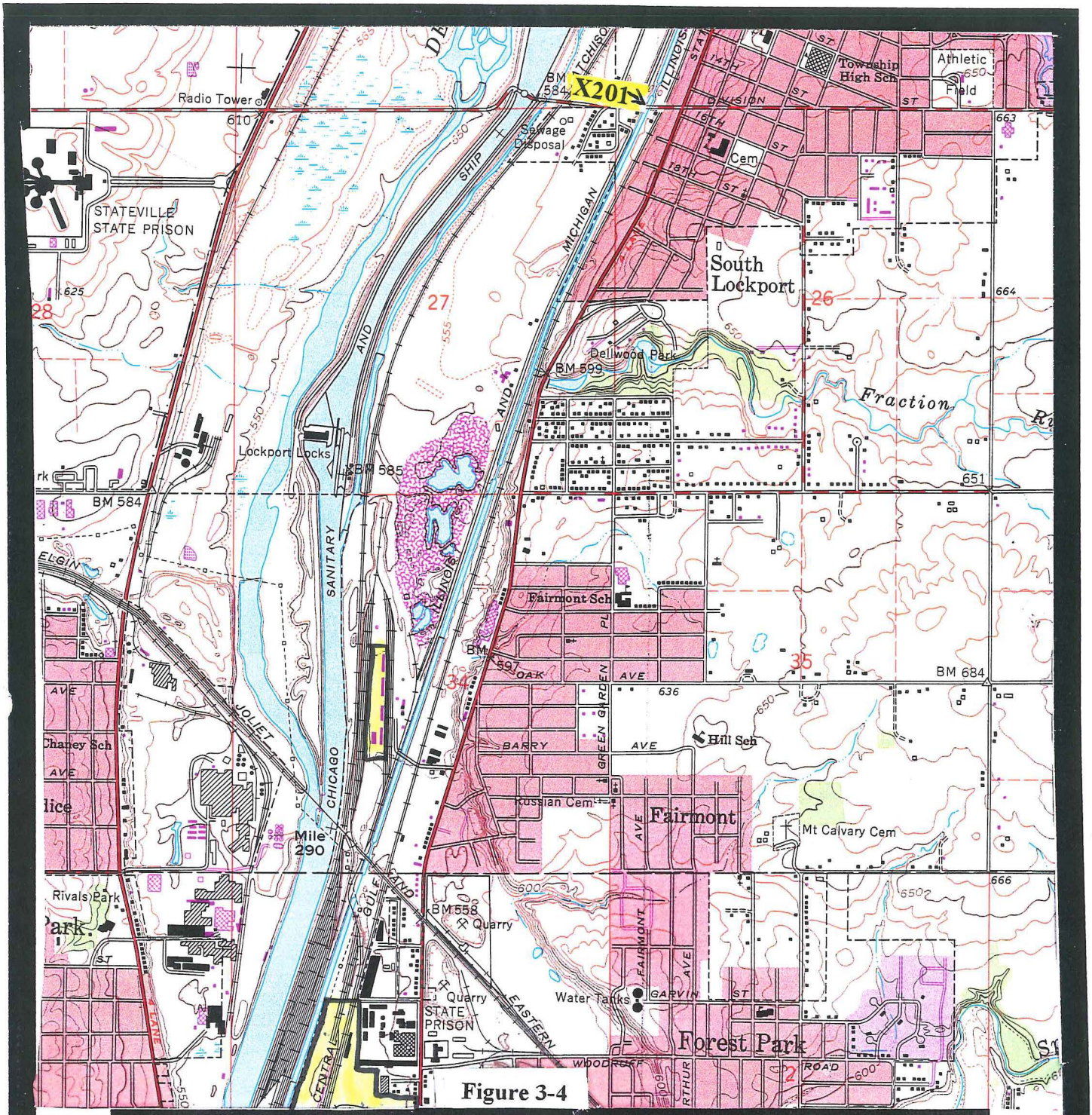


Figure 3-4

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY	SITE: U.S. Steel SITE ILD 005 454 566

BACKGROUND SEDIMENT SAMPLE LOCATION MAP

Scale: 1:24,000 N↑

LEGEND: ☐ Site Location

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TABLE 3-3
SAMPLE DESCRIPTIONS

SAMPLE	DEPTH (inches)	APPEARANCE	LOCATION
X101	0-2	Black loamy material.	Taken as a background sample from Washington Junior High School.
X102	0-2	Dark brown loamy material.	Residence at 819 N. Bluff St.
X103	0-2	Black loamy material.	Residence at 607 N. Herkimer St.
X104	0-2	Dark brown to black loam.	Lincoln School located at 960 Royce Ave.
X105/ X106	0-2	Dark brown to black loam.	Residence at 500 Ward St.
X107	0-2	Black loam material.	Parks School located at 500 Parks St.
X108	0-2	Black loamy material.	Residence at 117 Barry St.
X109	0-2	Black loamy material.	Residence at 110 Oak Ave.
X501	2-6	Dark black friable material.	Former US Steel small landfill.
X502	2-6	Dark red to brown cindery material.	Taken from what appeared to be slag material.
X201	0-12	Dark black silty material.	I & M Canal background sample.
X202	0-12	Black silty material with an oily substance in it.	I & M Canal downstream of coking facility but upstream of main facility.
X203/ X204	0-12	Black sludgy silt with an oily substance in it.	I & M Canal alongside the main facility.
X205	0-12	Black sludgy silt with an oily substance in it.	I & M Canal at confuence of Des Plaines River.
X206	0-12	Black silty material with an oily substance in it.	I & M Canal outside of WWTP discharge.
X208	0-6	Dark brown to black silt.	Penitentary Ditch downstream of main facility.

TARGET COMPOUND LIST

Volatile Target Compounds

Chloromethane	1,2-Dichloropropane
Bromomethane	cis-1,3-Dichloropropene
Vinyl Chlorde	Trichloroethene
Chloroethane	Dibromochloromethane
Methylene Chloride	1,1,2-Trichloroethane
Acetone	Benzene
Carbon Disulfide	trans-1,3-Dichloropropene
1,1-Dichloroethene	Bromoform
1,1-Dichloroethane	4-Methyl-2-pentanone
1,2-Dichloroehtene (total)	2-Hexanone
Chloroform	Tetrachloroethene
1,2-Dichloroethane	1,1,2,2-Tetrachloroethane
2-Butanone	Toluene
1,1,1-Trichloroethane	Chlorobenzene
Carbon Tetrachloride	Ethylbenzene
Vinyl Acetate	Styrene
Bromodichloromethane	Xylenes (total)

Base/Neutral Target Compounds

Hexachloroethane	2,4-Dinitrotoluene
bis(2-Chloroethyl) Ether	Diethylphthalate
Benzyl Alcohol	N-Nitrosodiphenylamine
bis (2-Chloroisopropyl) Ether	Hexachlorobenzene
N-Nitroso-Di-n-Propylamine	Phenanthrene
Nitrobenzene	4-Bromophenyl-phenylether
Hexachlorobutadiene	Anthracene

2-Methylnaphthalene	Di-n-Butylphthalate
1,2,4-Trichlorobenzene	Fluoranthene
Isophorone	Pyrene
Naphthalene	Butylbenzylphthalate
4-Chloroaniline	bis(2-Ethylhexyl)Phthalate
bis(2-chloroethoxy)Methane	Chrysene
Hexachlorocyclopentadiene	Benzo(a)Anthracene
2-Chloronaphthalene	3-3'-Dichlorobenzidene
2-Nitroaniline	Di-n-Octyl Phthalate
Acenaphthylene	Benzo(b)Fluoranthene
3-Nitroaniline	Benzo(k)Fluoranthene
Acenaphthene	Benzo(a)Pyrene
Dibenzofuran	Ideno(1,2,3-cd)Pyrene
Dimethyl Phthalate	Dibenz(a,h)Anthracene
2,6-Dinitrotoluene	Benzo(g,h,i)Perylene
Fluorene	1,2-Dichlorobenzene
4-Nitroaniline	1,3-Dichlorobenzene
4-Chlorophenyl-phenylether	1,4-Dichlorobenzene

Acid Target Compounds

Benzoic Acid	2,4,6-Trichlorophenol
Phenol	2,4,5-Trichlorophenol
2-Chlorophenol	4-Chloro-3-methylphenol
2-Nitrophenol	2,4-Dinitrophenol
2-Methylphenol	2-Methyl-4,6-dinitrophenol
2,4-Dimethylphenol	Pentachlorophenol
4-Methylphenol	4-Nitrophenol
2,4-Dichlorophenol	

Pesticide/PCB Target Compounds

alpha-BHC	Endrin Ketone
beta-BHC	Endosulfan Sulfate
delta-BHC	Methoxychlor
gamma-BHC (Lindane)	alpha-Chlordane
Heptachlor	gamma-Chlordane
Aldrin	Toxaphene
Heptachlor epoxide	Aroclor-1016
Endosulfan I	Aroclor-1221
4,4'-DDE	Aroclor-1232
Dieldrin	Aroclor-1242
Endrin	Aroclor-1248
4,4'-DDD	Aroclor-1254
Endosulfan II	Aroclor-1260
4,4'-DDT	

Inorganic Target Compounds

Aluminum	Manganese
Antimony	Mercury
Arsenic	Nickel
Barium	Potassium
Beryllium	Selenium
Cadmium	Silver
Calcium	Sodium
Chromium	Thallium
Cobolt	Vanadium
Copper	Zinc
Iron	Cyanide
Lead	Sulfide
Magnesium	

DATA QUALIFIERS

QUALIFIER	DEFINITION ORGANICS	DEFINITION INORGANICS
U	Compound was tested for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture. For soil samples subjected to GPC clean-up procedures, the CRQL is also multiplied by two, to account for the fact that only half of the extract is recovered.	Analyte was analyzed for but not detected.
J	Estimated value. Used when estimating a concentration for tentatively identified compounds (TICS) where a 1:1 response is assumed or when the mass spectral data indicate the presence of a compound that meets the identification criteria and the result is less than the sample quantitation limit but greater than zero. Used in data validation when the quality control data indicate that a value may not be accurate.	Estimated value. Used in data validation when the quality control data indicate that a value may not be accurate.
C	This flag applies to pesticide results where the identification is confirmed by GC/MS.	Method qualifier indicates analysis by the Manual Spectrophotometric method.
B	Analyte was found in the associated blank as well as in the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.	The reported value is less than the CRDL but greater than the instrument detection limit (IDL).
D	Identifies all compounds identified in an analysis at a secondary dilution factor. If a sample or extract is re-analyzed at a higher dilution factor as in the "E" flag, the "DL" suffix is appended to the sample number on the Form I for the diluted sample, and all concentration values are flagged with the "D" flag.	Not used.
E	Identifies compounds whose concentrations exceed the calibration range for that specific analysis. All extracts containing compounds exceeding the calibration range must be diluted and analyzed again. If the dilution of the extract causes any compounds identified in the first analysis to be below the calibration range in the second analysis, then the results of both analyses must be reported on separate Forms I. The Form I for the diluted sample must have the "DL" suffix appended to the sample number.	The reported value is estimated because of the presence of interference.
A	This flag indicates that a TIC is a suspected aldol concentration product formed by the reaction of the solvents used to process the sample in the laboratory.	Method qualifier indicates analysis by Flame Atomic Absorption (AA).
M	Not used.	Duplicate injection (a QC parameter not met).

N	Not used	Spiked sample (a QC parameter not met).
S	Not used.	The reported value was determined by the Method of Standard Additions (MSA).
W	Not used.	Post digestion spike for Furnace AA analysis (a QC parameter) is out of control limits of 85% to 115% recovery, while sample absorbance is less than 50% of spike absorbance.
*	Not used.	Duplicate analysis (a QC parameter not within control limits).
+	Not used.	Correlation coefficient for MSA (a QC parameter) is less than 0.995.
P	Not used.	Method qualifier indicates analysis by ICP (Inductively Coupled Plasma) Spectroscopy.
CV	Not used.	Method qualifier indicates analysis by Cold Vapor AA.
AV	Not used.	Method qualifier indicates analysis by Automated Cold Vapor AA.
AS	Not used.	Method qualifier indicates analysis by Semi-Automated Cold Spectrophotometry.
T	Not used.	Method qualifier indicates Titrimetric analysis.
NR	The analyte was not required to be analyzed.	The analyte was not required to be analyzed.
R	Rejected data. The QC parameters indicate that the data is not usable for any purpose.	Rejected data. The QC parameters indicate that the data is not usable for any purpose.

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Table 3–4
Soil Sample Results

SAMPLING POINT / PARAMETER	X101 Bkgd. Soil	X102 Soil	X103 Soil	X104 Soil	X105 Soil	X106 Soil	X107 Soil	X108 Soil	X109 Soil	X501 Soil	X502 Soil
VOLATILES	No volatiles detected.	Volatiles not analyzed for ----------								No volatiles detected.	
ug/Kg											
SEMI–VOLATILES											
Naphthalene	440.0 U	71.0 J	74.0 J		39.0 J	39.0 J	47.0 J	72.0 J	65.0 J	26.0 J	
2–Methylnaphthalene	440.0 U	58.0 J	120.0 J	27.0 J	56.0 J	55.0 J	85.0 J	88.0 J	71.0 J	24.0 J	
Acenaphthylene	440.0 U	170.0 J	40.0 J								
Acenapthene	440.0 U	45.0 J	53.0 J		43.0 J	44.0 J	230.0 J				
Dibenzofuran	440.0 U	25.0 J	78.0 J		45.0 J	41.0 J	150.0 J	32.0 J	35.0 J		
Fluorene	1100.0 U	26.0 J	54.0 J		40.0 J	38.0 J	260.0 J				
N–Nitrosodiphenylamine	440.0 U					27.0 J					
Phenanthrene	100.0 J	990.0	1200.0	250.0 J	750.0	750.0	3500.0	330.0 J	260.0 J	160.0 J	65.0 J
Anthracene	440.0 U	170.0 J	100.0 J	26.0 J	96.0 J	92.0 J	620.0	32.0 J	26.0 J	45.0 J	
Carbazole	440.0 U	40.0 J	130.0 J	26.0 J	79.0 J	65.0 J	450.0 J	37.0 J			
Di–n–Butylphthalate	170.0 J	150.0 J	380.0 J	120.0 J	3320.0 J	220.0 J	200.0 J	300.0 J	330.0 J	250.0 J	280.0 J
Fluoranthene	160.0 J	1700.0	1300.0	410.0 J	1000.0	1100.0	5000.0 E	580.0	300.0 J	270.0 J	92.0 J
Pyrene	150.0 J	1300.0	1200.0	250.0 J	1100.0	1000.0	3300.0	520.0	220.0 J	190.0 J	85.0 J
Butylbenzylphthalate	440.0 U	73.0 J	35.0 J	78.0 J	45.0 J	28.0 J	130.0 J	150.0 J	59.0 J		
Benzo(A) anthracene	86.0 J	950.0	620.0	190.0 J	610.0	570.0	1700.0	300.0 J	130.0 J	170.0 J	58.0 J
Chrysene	130.0 J	1200.0	950.0	250.0 J	690.0	630.0	2000.0	470.0	230.0 J	220.0 J	95.0 J
bis(2–Ethylhexyl)Phthalate	400.0 J	300.0 J	170.0 J	1800.0	150.0 J	120.0 J	5700.0 E	230.0 J	82.0 J	120.0 J	35.0 J
Di–n–Octyl Phthalate	440.0 U	280.0 J					4700.0 E				
Benzo(b)Fluoranthene	120.0 J	1300.0	790.0	220.0 J	540.0	620.0	1500.0	520.0	180.0 J	280.0 J	79.0 J
Benzo(k)Fluoranthene	83.0 J	840.0	740.0	170.0 J	540.0	350.0 J	1600.0	280.0 J	140.0 J	250.0 J	55.0 J
Benzo(a)Pyrene	100.0 J	1200.0	750.0	170.0 J	560.0	530.0	1500.0	360.0 J	130.0 J	240.0 J	59.0 J
Indeno(1,2,3–cd)Pyrene	75.0 J	720.0	430.0 J	130.0 J	400.0 J	350.0 J	840.0	260.0 J	120.0 J	210.0 J	52.0 J
Dibenz(a,h)Anthracene	28.0 J	360.0 J	260.0 J	53.0 J	180.0 J	190.0 J	480.0 J	120.0 J	51.0 J	65.0 J	
Benzo (g,h,i)Perylene	89.0 J	880.0	530.0	150.0 J	440.0 J	370.0 J	1000.0	270.0 J	95.0 J	230.0 J	52.0 J
ug/Kg											
PESTICIDES											
delta–BHC	4.5 U	0.6 JP								0.3 JP	
Heptachlor	4.5 U				0.7 JP	1.0 JP					
Aldrin	2.5 JP			5.2 JP					3.5	4.2	2.2 P
Heptachlor epoxide	3.0 JP	20.0 P	5.3 P	130.0	17.0 P	15.0 P	28.0 P	48.0 P	6.5	4.6 P	3.6 P
Dieldrin	8.8 U	6.5					13.0 J	3.6 JP		7.1 P	
4, 4'– DDE	77.0	14.0 P	25.0 P	11.0 JP	7.1 P	7.4 P	64.0	160.0	6.3	1.9 JP	1.0 JP
Endrin	11.0			22.0 JP	5.1 P	6.0 P	5.0 JP				0.5 JP
Endosulfan II	8.8 U		5.8 JP								
4, 4'– DDD	2.3 JP						5.0 JP	12.0 JP	1.5 JP	3.1 J	
Endosulfan Sulfate	6.2 JP	7.7 P	20.0 P		5.7 P	7.9 P	10.0 JP	6.7 JP	3.2 JP	0.6 JP	0.7 JP
4, 4'– DDT	55.0	19.0 P	12.0 P	66.0	3.8 JP	7.4 P	110.0 P	190.0	9.6 P	11.0 P	0.7 JP
Methoxychlor	45.0 U			49.0 JP						5.9 JP	
Endrin ketone	2.3 JP	7.7 P	4.1 JP	32.0 J	6.2 P	6.1 P	6.5 JP	5.1 JP	2.4 JP	4.5 J	1.4 JP
alpha–chlordane	1.7 JP		31.0 P	17.0 JP	2.0 JP	2.0 JP		56.0	1.8 JP	9.1 P	1.0 JP
gamma–chlordane	0.5 JP		2.5 JP	23.0 P	0.6 JP	1.3 JP	6.5 JP	44.0		8.6	
Aroclor– 1260	88.0 U							370.0 JP		220.0	
ug/Kg											
INORGANICS											
Aluminum	13100.0	16600.0	10500.0	13300.0	14500.0	17500.0	10300.0	17700.0	13500.0	4190.0	2340.0
Antimony	0.6 B	1.4 B	2.2 B	0.5 U	0.8 B	1.3 B	0.5 B	0.8 B	0.5 U	1.3 B	0.4 U
Arsenic	13.0	15.1	32.0	8.4	12.2	13.4	18.2	12.5	12.4	26.8	13.2
Barium	156.0	154.0	273.0	153.0	228.0	234.0	107.0	175.0	114.0	77.8	100.0
Beryllium	1.5	1.3	2.5	1.7	1.3	1.6	1.2	1.9	0.9 B	0.4 B	0.7 B
Cadmium	3.4	2.1	5.9	0.9 B	1.5	2.1	9.8	1.9	0.8 B	9.3	0.6 B
Calcium	16000.0	45400.0	49600.0	49100.0	13900.0	14900.0	31600.0	55700.0	12100.0	18600.0	1760.0
Chromium	19.7	26.0	22.0	16.9	18.9	22.6	15.0	22.0	19.6	246.0	5.3
Cobalt	8.6 B	9.4 B	9.3 B	6.8 B	9.3 B	9.8 B	6.4 B	10.2 B	10.0 B	16.1	9.9
Copper	30.5	52.2	80.1	28.7	38.3	42.1	27.8	41.3	31.3	195.0	46.0
Iron	26400.0	40000.0	52100.0	16300.0	25300.0	28900.0	23500.0	28700.0	23200.0	386000.0	148000.0
Lead	83.7	299.0	561.0	135.0	146.0	148.0	132.0	218.0	80.1	824.0	25.9
Magnesium	13200.0	26500.0	25900.0	17300.0	6640.0	6940.0	15800.0	20300.0	8340.0	3780.0	537.0 B
Manganese	611.0	925.0	838.0	967.0	1120.0	1080.0	667.0	1020.0	606.0	2800.0	7500.0
Mercury	0.1 U	0.8	0.6	0.1 U	1.8	2.0	0.2	0.2	0.1	0.2	0.1 U
Nickel	24.8	23.3	28.2	15.8	20.3	24.1	15.2	27.1	25.6	151.0	4.7 B
Potassium	3900.0	5480.0	2810.0	2580.0	3070.0	3920.0	2550.0	43300.0	3030.0	1160.0	374.0 B
Selenium	0.9 B	0.8 B	1.1	1.1 B	1.1 B	1.2 B	0.9 B	1.0 B	0.7 B	0.7 U	1.2
Silver	0.3 U	0.4 B	0.5 B	0.3 U	0.2 U	0.3 U	0.2 U	0.3 U	0.2 U	1.5 B	0.2 U
Sodium	230.0 B	126.0 B	354.0 B	246.0 B	108.0 B	290.0	194.0 B	307.0 B	72.3 B	52.2 U	44.7 U
Thallium	0.8 U	0.8 U	0.6 U	0.8 U	0.7 U	0.8 U	0.7 U	0.8 U	0.7 U	3.4 U	2.9 U
Vanadium	28.6	29.6	28.5	22.7	31.2	38.2	26.3	28.5	29.4	9.3 B	16.8
Zinc	337.0	366.0	1100.0	150.0	299.0	409.0	199.0	319.0	202.0	5950.0	65.8
Cyanide	0.6 U	0.6 U	0.6 U	1.9	0.6 U	0.5 U	0.5 U	2.2	0.5 U	4.8	0.5 U

mg/Kg

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Table 3–4
Sediment Sample Results

SAMPLING POINT / PARAMETER	X201 Bkgd. Sediment	X202 Sediment	X203 Sediment	X204 Sediment	X205 Sediment	X206 Sediment	X208 Sediment
VOLATILES							
2–Butanone	14.0 U		240.0	47.0	80.0		
ug/Kg							
SEMI–VOLATILES							
Naphthalene	58.0 J	80.0 J	3200.0 J	5500.0 J	990.0	430.0 J	100.0 J
2–Methylnaphthalene	53.0 J	83.0 J	1300.0 J	2400.0 J	600.0 J	270.0 J	64.0 J
Acenaphthylene	62.0 J	150.0 J	2700.0 J	4000.0 J	1000.0	390.0 J	120.0 J
Acenaphthene	200.0 J	260.0 J	32000.0	51000.0	7200.0 E	560.0 J	200.0 J
2–Nitrophenol	450.0 U					59.0 J	
Dibenzofuran	53.0 J	36.0 J	13000.0	23000.0	1900.0	280.0 J	120.0 J
Fluorene	120.0 J	54.0 J	33000.0	58000.0	6300.0 E	610.0 J	170.0 J
N–Nitrosodiphenylamine (	140.0 J	160.0 J	1100.0 J			97.0	
Phenanthrene	1200.0	660.0	150000.0 E	160000.0 E	16000.0 E	3000.0	2600.0
Anthracene	320.0 J	490.0 J	47000.0	83000.0 E	6600.0 E	1300.0	440.0 J
Carbazole	140.0 J	98.0 J	1200.0 J	2000.0 J	220.0 J	110.0 J	470.0 J
Di–n–Butylphthalate	160.0 J	33.0 J			76.0 J	87.0 J	90.0 J
Fluoranthene	2700.0	3300.0	150000.0 E	260000.0 E	17000.0 E	6000.0 E	4500.0
Pyrene	2000.0	2200.0	120000.0 E	160000.0 E	11000.0 E	3800.0	3800.0
Benzo(A) anthracene	1400.0	2100.0	79000.0 E	110000.0 E	17000.0 E	3500.0	
Chrysene	1500.0	2700.0	78000.0 E	110000.0 E	16000.0 E	4800.0	2100.0
bis(2–Ethylhexyl)Phthalate	240.0 J	590.0			48.0 J	1400.0	3200.0
Benzo(b)Fluoranthene	1200.0	2400.0	38000.0	79000.0 E	11000.0 E	4500.0	3600.0
Benzo(k)Fluoranthene	1100.0	2100.0	44000.0	55000.0	9000.0 E	4500.0	2300.0
Benzo(a)Pyrene	1200.0	2200.0	44000.0	75000.0	15000.0 E	5000.0	2800.0
Indeno(1,2,3–cd)Pyrene	750.0	1100.0	30000.0	47000.0	4500.0	2600.0	1800.0
Dibenz(a,h)Anthracene	390.0 J	720.0	19000.0	25000.0	2800.0	1600.0	1100.0
Benzo (g,h,i)Perylene	870.0	1100.0	27000.0	37000.0	5400.0	2500.0	2300.0
ug/Kg							
PESTICIDES							
Aldrin	18.0 U	8.5 JP	6.3 JP	5.8 JP	4.3 JP	8.8 JP	64.0 P
Heptachor epoxide	47.0 P	23.0 JP	38.0 P	39.0 P	25.0	20.0	130.0
Dieldrin	5.5 JP						32.0 JP
4, 4'– DDE	6.7 JP	28.0 J		6.9 JP	2.0 JP	10.0 JP	72.0 P
Endrin	36.0 U				14.0 P		
4, 4'– DDD	36.0 U	12.0 JP	16.0 J P	31.0 JP	38.0 P	11.0 J	30.0 J
Endosulfan Sulfate	36.0 U		22.0 JP				
4, 4'– DDT	36.0 U		20.0 J				
Endrin ketone	8.4 JP	67.0 P	170.0 P	210.0 P	110.0	24.0 J	34.0 JP
alpha–chlordane	18.0 U	17.0 JP		4.8 JP		5.3 JP	11.0 JP
gamma chlordane	4.8 JP				0.7 JP	4.7 JP	42.0 P
Aroclor–1248	360.0 U						3700.0
ug/Kg							
INORGANICS							
Aluminum	3570.0	15900.0	13600.0	12700.0	13900.0	13000.0	5000.0
Antimony	0.4 U		1.4 B		0.8 B		1.8 B
Arsenic	5.2	11.6	19.1	21.1	13.9	9.6	28.9
Barium	48.7	109.0	178.0	191.0	148.0	125.0	80.8 B
Beryllium	0.5 B	1.0 B	1.0 B	1.0 B	1.0 B	0.9 B	0.7 B
Cadmium	0.8 B	2.5 B	2.0	2.1	1.5	3.7	24.4
Chromium	11.9	79.0	91.7	103.0	55.4	65.2	168.0
Cobalt	3.7 B	9.2 B	7.5 B	8.3 B	10.9 B	8.6 B	12.2 B
Copper	179.0	91.9	179.0	202.0	110.0	128.0	163.0
Lead	59.3	232.0	247.0	278.0	214.0	223.0	1140.0
Magnesium	44100.0	19300.0	12700.0	14200.0	24600.0	18500.0	12000.0
Manganese	230.0	292.0	328.0	377.0	1700.0	329.0	1030.0
Mercury	0.1	0.7	3.6	4.4	2.8	0.9	1.8
Nickel	11.4	34.9	25.9	28.1	28.7	37.7	96.1
Potassium	1050.0	4180.0	3810.0	3430.0	4170.0	3120.0	
Selenium	0.6 U						3.6
Silver	0.2 U	0.6 B	2.9	3.1 B	2.0 B	1.3 B	1.8 B
Sodium	523.0 B	310.0 B	240.0 B	273.0 B	311.0 B	384.0 B	774.0 B
Vanadium	9.0 B	32.6	28.1	26.7	27.1	25.0	13.0 B
Zinc	169.0	255.0	538.0	597.0	400.0	374.0	16300.0
Cyanide	0.6 U						3.6
mg/Kg							

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Table 3–5
Key Soil Samples

SAMPLING POINT / PARAMETER	X101 Bkgd. Soil	X102 Soil	X103 Soil	X104 Soil	X105 Soil	X106 Soil	X107 Soil	X108 Soil	X109 Soil	X501 Soil	X502 Soil
VOLATILES ug/Kg	No volatiles detected.	Volatiles not analyzed for								No volatiles detected.	
SEMI–VOLATILES											
Naphthalene	440.0 U	71.0 J	74.0 J		39.0 J	39.0 J	47.0 J	72.0 J	65.0 J	26.0 J	
2–Methylnaphthalene	440.0 U	58.0 J	120.0 J	27.0 J	56.0 J	55.0 J	85.0 J	88.0 J	71.0 J	24.0 J	
Acenaphthylene	440.0 U	170.0 J	40.0 J								
Acenapthene	440.0 U	45.0 J	53.0 J		43.0 J	44.0 J	230.0 J				
Dibenzofuran	440.0 U	25.0 J	78.0 J		45.0 J	41.0 J	150.0 J	32.0 J	35.0 J		
Fluorene	1100.0 U	26.0 J	54.0 J		40.0 J	38.0 J	260.0 J				
Phenanthrene	100.0 J	990.0	1200.0		750.0	750.0	3500.0	330.0 J			
Anthracene	440.0 U	170.0 J	100.0 J	26.0 J	96.0 J	92.0 J	620.0	32.0 J	26.0 J	45.0 J	
Carbazole	440.0 U	40.0 J	130.0 J	26.0 J	79.0 J	65.0 J	450.0 J	37.0 J			
Di–n–Butylphthalate	170.0 J				3320.0 J						
Fluoranthene	160.0 J	1700.0	1300.0		1000.0	1100.0	5000.0 E	580.0			
Butylbenzylphthalate	440.0 U	73.0 J	35.0 J	78.0 J	45.0 J	28.0 J	130.0 J	150.0 J	59.0 J		
Benzo(A) anthracene	86.0 J	950.0	620.0		610.0	570.0	1700.0	300.0 J			
Chrysene	130.0 J	1200.0	950.0		690.0	630.0	2000.0	470.0			
bis(2–Ethylhexyl)Phthalate	400.0 J			1800.0			5700.0 E				
Di–n–Octyl Phthalate	440.0 U	280.0 J					4700.0 E				
Benzo(b)Fluoranthene	120.0 J	1300.0	790.0		540.0	620.0	1500.0	520.0			
Benzo(k)Fluoranthene	83.0 J	840.0	740.0		540.0	350.0 J	1600.0	280.0 J			
Benzo(a)Pyrene	100.0 J	1200.0	750.0		560.0	530.0	1500.0	360.0 J			
Indeno(1,2,3–cd)Pyrene	75.0 J	720.0	430.0 J		400.0 J	350.0 J	840.0	260.0 J			
Dibenz(a,h)Anthracene	28.0 J	360.0 J	260.0 J		180.0 J	190.0 J	480.0 J	120.0 J			
Benzo (g,h,i)Perylene ug/Kg	89.0 J	880.0	530.0		440.0 J	370.0 J	1000.0	270.0 J			52.0 J
PESTICIDES											
delta–BHC	4.5 U	0.6 JP								0.3 JP	
Heptachlor	4.5 U				0.7 JP	1.0 JP					
Aldrin	2.5 JP										
Heptachlor epoxide	3.0 JP	20.0 P		130.0	17.0 P	15.0 P	28.0 P	48.0 P			
Dieldrin	8.8 U										
4, 4'– DDE	77.0										
Endrin	11.0										
Endosulfan II	8.8 U		5.8 JP								
4, 4'– DDD	2.3 JP							12.0 JP			
Endosulfan Sulfate	6.2 JP	7.7 P	20.0 P		5.7 P	7.9 P	10.0 JP	6.7 JP	3.2 JP	0.6 JP	
4, 4'– DDT	55.0										
Methoxychlor	45.0 U										
Endrin ketone	2.3 JP			32.0 J							
alpha–chlordane	1.7 JP		31.0 P	17.0 JP				56.0		9.1 P	
gamma–chlordane	0.5 JP		2.5 JP	23.0 P			6.5 JP	44.0		8.6	
Aroclor– 1260 ug/Kg	88.0 U							370.0 JP		220.0	
INORGANICS											
Antimony	0.6 B		2.2 B								
Lead	83.7	299.0	561.0							824.0	25.9
Mercury	0.1 U	0.8	0.6		1.8	2.0					
Nickel	24.8									151.0	
Potassium	3900.0							43300.0			
Zinc	337.0		1100.0							5950.0	
Cyanide	0.6 U							2.2		4.8	

mg/Kg

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Table 3–5
Key Sediment Samples

SAMPLING POINT PARAMETER	X201 Bkgd. Sediment	X202 Sediment	X203 Sediment	X204 Sediment	X205 Sediment	X206 Sediment	X208 Sediment
VOLATILES							
2–Butanone	14.0 U		240.0	47.0	80.0		
ug/Kg							
SEMI–VOLATILES							
Naphthalene	58.0 J		3200.0 J	5500.0 J	990.0	430.0 J	
2–Methylnaphthalene	53.0 J		1300.0 J	2400.0 J	600.0 J	270.0 J	
Acenaphthylene	62.0 J		2700.0 J	4000.0 J	1000.0	390.0 J	
Acenaphthene	200.0 J		32000.0	51000.0	7200.0 E	560.0 J	
2–Nitrophenol	450.0 U					59.0 J	
Dibenzofuran	53.0 J		13000.0	23000.0	1900.0	280.0 J	
Fluorene	120.0 J		33000.0	58000.0	6300.0 E	610.0 J	
N–Nitrosodiphenylamine (	140.0 J		1100.0 J				
Phenanthrene	1200.0		150000.0 E	160000.0 E	16000.0 E		
Anthracene	320.0 J		47000.0	83000.0 E	6600.0 E	1300.0	
Carbazole	140.0 J		1200.0 J	2000.0 J			470.0 J
Fluoranthene	2700.0		150000.0 E	260000.0 E	17000.0 E	6000.0 E	
Pyrene	2000.0		120000.0 E	160000.0 E	11000.0 E		
Benzo(A) anthracene	1400.0		79000.0 E	110000.0 E	17000.0 E		
Chrysene	1500.0		78000.0 E	110000.0 E	16000.0 E	4800.0	
bis(2–Ethylhexyl)Phthalate	240.0 J					1400.0	
Benzo(b)Fluoranthene	1200.0		38000.0	79000.0 E	11000.0 E	4500.0	3600.0
Benzo(k)Fluoranthene	1100.0		44000.0	55000.0	9000.0 E	4500.0	
Benzo(a)Pyrene	1200.0		44000.0	75000.0	15000.0 E	5000.0	
Indeno(1,2,3–cd)Pyrene	750.0		30000.0	47000.0	4500.0	2600.0	
Dibenz(a,h)Anthracene	390.0 J		19000.0	25000.0	2800.0	1600.0	
Benzo (g,h,i)Perylene	870.0		27000.0	37000.0	5400.0		
ug/Kg							
PESTICIDES							
Aldrin	18.0 U	8.5 JP	6.3 JP	5.8 JP	4.3 JP	8.8 JP	64.0 P
Dieldrin	5.5 JP						32.0 JP
4, 4' – DDE	6.7 JP	28.0 J					72.0 P
Endrin	36.0 U				14.0 P		
4, 4' – DDD	36.0 U	12.0 JP	16.0 J P	31.0 JP	38.0 P	11.0 J	30.0 J
Endosulfan Sulfate	36.0 U		22.0 JP				
4, 4' – DDT	36.0 U		20.0 J				
Endrin ketone	8.4 JP	67.0 P	170.0 P	210.0 P	110.0		34.0 JP
alpha–chlordane	18.0 U	17.0 JP		4.8 JP		5.3 JP	11.0 JP
Aroclor–1248	360.0 U						3700.0
ug/Kg							
INORGANICS							
Aluminum	3570.0	15900.0	13600.0	12700.0	13900.0	13000.0	
Antimony	0.4 U						1.8 B
Arsenic	5.2		19.1	21.1			28.9
Barium	48.7		178.0	191.0	148.0		
Cadmium	0.8 B					3.7	24.4
Chromium	11.9	79.0	91.7	103.0	55.4	65.2	168.0
Lead	59.3	232.0	247.0	278.0	214.0	223.0	1140.0
Manganese	230.0				1700.0		1030.0
Mercury	0.1	0.7	3.6	4.4	2.8	0.9	1.8
Nickel	11.4	34.9			28.7	37.7	96.1
Potassium	1050.0	4180.0	3810.0	3430.0	4170.0	3120.0	
Silver	0.2 U		2.9	3.1 B	2.0 B	1.3 B	1.8 B
Vanadium	9.0 B	32.6	28.1		27.1		
Zinc	169.0			597.0			16300.0
Cyanide	0.6 U						3.6
mg/Kg							

4. IDENTIFICATION OF SOURCES

4.1 Contaminated Soil

During the 1989 E & E SSI sampling event three soil samples were collected from the former USS property to help characterize the soils. During the 1995 FSIP sampling event eight soil samples were collected from the properties surrounding the USS property. Both sampling events indicated the presence of numerous contaminants above background levels. The potential exists that the source of contaminants for the residential soil contamination were air emissions from the the steel plant when it was in operation. This is explained in greater detail in Section 5.3 under "Air Migration Pathway".

4.2 Landfill

A US EPA Notification of Hazardous Waste Site form was submitted by USS in May 1981. The form identified a small landfill, of approximately 3,800 cubic feet, located on their property in which acids, used pickling liquor, sludge from the waste water treatment plant and material from plant spills had been deposited from 1972 until 1980. One sample (X501) was collected from the landfill during the 1995 FSIP sampling event. This sample detected several contaminants at levels above background. See Table 3-4 for a summary of the analytical results from this sample.

4.3 Slag Pile

A portion of the former USS property is covered with what appears to be a slag material. The majority of this was located on the northwest portion of the main facility property on land that is now owned by the Will County Forest Preserve. One sample (X502) was collected from this slag material and was found to contain numerous contaminants above background levels consisting mainly of semi-volatiles. See Table 3-4 for a summary of the analytical results from this sample.

5. MIGRATION PATHWAYS

5.1 Groundwater Pathway

The city of Joliet obtains its municipal water supply from numerous wells located throughout the city. Two of these wells are located within one mile of the US Steel property. In addition, the Joliet Correctional Center well is located within one mile of the site. All three of these wells obtain water from a depth of about 1500 feet from the Cambrian-Ordivician aquifer. Overlying this aquifer is the Maquoketa shale formation which forms a geologic layer which is essentially impermeable. Private wells that utilize the shallow glacial till aquifer for a water supply are located over one and a half miles from the site. Due to these facts, no groundwater samples were collected during the FSIP sampling event. For a much more detailed discussion of the geology and potential groundwater targets refer to the 1991 SSI report prepared by E & E.

5.2 Surface Water Pathway

Surface water drainage from the former US Steel property flows into two surface water bodies. These are the I & M Canal and Penitentary Ditch. The I & M Canal is a large perenially flowing canal which flows along the western portion of the property. At the southern tip of the former USS property the canal flows into the Des Plaines River. The I & M Canal and Des Plaines River are used as fisheries and for other recreational purposes. Penitentary Ditch is a small intermittently flowing ditch which

originates on the northern portion of the property and flows southward through the property until it enters an underground storm sewer just after it exits the USS property. According to Richard Clark, of Joliet public works, the storm sewer flows southward underground for about 2 1/4 miles until it discharges into Hickory Creek. Prior to the construction of a waste water treatment plant in 1971, untreated waste water was routinely discharged from USS into Penitentary Ditch.

Seven sediment samples were collected from these waterways during the FSIP sampling event to help determine whether they have been impacted by site activities. Sediment samples X201 - X206 were collected from the I & M Canal and X208 was taken from Penitentary Ditch. The following table displays where each of these samples were collected. See Figures 3-1 and 3-2 for a map showing the locations of these samples.

Sample	Location
X201	Upstream of coking facility. Taken as I & M Canal background sample.
X202	I & M Canal upstream of main facility but downstream of coking facility.
X203	I & M Canal alongside main facility.
X204	I & M Canal alongside main facility.
X205	I & M Canal at confluence of Des Plaines River.
X206	I & M Canal outside of facility waste water treatment plant discharge.
X208	Penitentary Ditch downstream of facility.

The concentrations of contaminants found in the sediment samples along the surface water pathway were compared to the Ontario Aquatic Sediment Quality Guidelines. These sediment quality guidelines are nonregulatory ecological benchmark values that serve as indicators of potential aquatic impacts. The severe effect levels (SELs) represent heavily polluted conditions that are expected to affect the health of benthic organisms. The lowest effect levels (LELs) represent marginally polluted conditions that are expected to have an effect on a small number of sediment-dwelling organisms. It should be pointed out that Ontario sediment standard benchmarks are only available for a limited number of contaminants and thus all of the contaminants sampled for cannot be compared to these benchmarks.

Sediment sample X202 was found to contain several contaminants at levels above background. The levels of the majority of these contaminants, however, were not detected at levels which are significantly above background. No contaminants were detected in X202 above SELs although several were found to be above LELs. Sediment samples X203 and X204 were found to contain numerous contaminants at levels significantly above background. Several semi-volatiles were detected at very high concentrations, however, when compared to Ontario benchmarks the semi-volatiles were above LELs but below SELs. Lead and mercury, however, did exceed the Ontario SELs and were at levels significantly above background. Copper also exceeded SELs but was also detected at

elevated levels in the upstream background sample and thus cannot be attributed to the site. Sediment samples X205 and X206 were also found to contain several contaminants at levels significantly above background. The majority of the semi-volatiles in these two samples were detected at levels significantly above background but at levels much lower than X203 and X204 taken upstream. Samples X205 and X206 contained several contaminants at levels above LELs but only mercury was detected above SELs in X205.

Sediment sample X208 was collected from Penitentary Ditch and was found to contain several contaminants at levels significantly above background. Of these chromium, lead, nickel and zinc were detected above SELs.

The following table compares the concentrations of some of the contaminants found in the sediment samples to LELs and SELs. See Figure 3-1 for the locations of these samples.

			I & M Canal					Penitentary Ditch	
	LEL	**SEL**	**X201**	**X202**	**X203**	**X204**	**X205**	**X206**	**X208**
chromium	26	110	12	79	92	103	55	65	**168**
copper	16	110	179	92	179	202	110	128	163
lead	31	250	59	232	247	**278**	214	223	**1140**
mercury	.2	2	0.1	0.7	**3.6**	**4.4**	**2.8**	0.9	1.8
nickel	16	75	11	35	26	28	29	38	96
PAHs	2	110 00	11	35	26	28	29	38	**96**
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm

5.3 Air Pathway

USS had a history of US EPA air emission violations during the 1970s and early 1980s. The violations involved operating a number of porcessess without proper operating permits, including nail galvanizing lines, steel grinders and a cleaning house. USS had applied for the required operating permits for these processes in 1974 and again in 1975, but the applications were denied by IEPA because of the potential for an excessive amount of particulate release from these processes. IEPA inspectors also observed air emission violations during site inspections.

No air samples were collected during the CERCLA sampling event, however, soil samples were collected from nearby residence's yards. This was done to help determine whether air emissions from USS may have impacted the nearby soils. The results of

these samples are discussed in Section 5.4. No schools or daycare facilities exist within 200 feet of the former US Steel property. An estimated 102,000 people reside within a four-mile radius of the property.

5.4 Soil Exposure

The nature of the steel industry is such that air emissions from the facility are expected and USS had a history of air emissions violations. Due to this and the fact that the former US Steel property is surrounded by residential neighborhoods, six soil samples were collected from residential yards and two were collected from nearby schools to help determine whether contaminants from the site have migrated to the surrounding neighborhoods. Of the six residential samples, four were collected in the vicinity of the former USS main facility and two (X108 and X109) were collected near the former coking operation. The samples detected contaminants at levels that are significantly above background levels. These contaminants included several semi-volatiles, pesticides and inorganics. Sample location maps can be seen on Figures 3-1 and 3-2 and a summary of the analytical results can be seen on Table 3-4.

The following table shows the analytical results of the residences and schools for contaminants that exceeded health based benchmarks contained in the Superfund Data Chemical Matrix (SCDM). In addition, the Illinois Department of Public Health

has recently been sent the analytical results and will produce a health assessment report that will better determine the risks of the residences to these and other contaminants. The contaminants that were found to exceed SCDM soil exposure benchmarks are benzo(a)pyrene, heptachlor epoxide, aroclor-1260 (PCBs) and lead. The analytical levels of contaminants detected in residential soils and the schools that both exceed the benchmarks and are at least three times background levels are printed in **bold.**

Sample #	benzo(a) pyrene	heptachlor epoxide	aroclor-1260	lead
X101(bkgd.)	100	3	U	84
X102	**1200**	20	U	299
X103	**750**	5	U	**561**
X104 school	170	**130**	U	135
X105	**560**	17	U	146
X106	**530**	15	U	148
X107 school	**1500**	28	U	132
X108 coking	**360**	48	**370**	218
X109 coking	130	6	U	80
SCDM benchmark	51 ppb	64 ppb	76 ppb	400 ppm

U - undetected